

Mountains to the Sea Educator Activity Guide: *Animal Tracks and Signs*



Alive with Wonder



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Admission Free

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Sunday noon–5:00 p.m.

The Museum Store

Unusual gifts and educational items that focus on nature and science
Mon–Sat 9:00 a.m.–5:00 p.m.
Sunday noon–5:00 p.m.

School Programs

For more information about the Museum's school programs, contact Barbara Beaman, coordinator of classroom programming, at 919.733.7450, ext.610, or e-mail barbara.beaman@ncmail.net

Visit the Museum on the World Wide Web at
www.naturalsciences.org

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by Margaret Cotrufo.*

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Mountains to the Sea Educator Activity Guide:

Animal Tracks and Signs

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Welcome

to the Mountains to the Sea Exhibit Hall

Mountains to the Sea, the Museum's largest gallery, spans the second and third floors and covers approximately 7,000 square feet. This exhibit takes you and your students through selected habitat dioramas—each presenting a snapshot taken in spring—to highlight our state's incredible diversity from the highest mountaintops to the cypress swamps of our Coastal Plain. We took great care to show a realistic assemblage of the plants and animals that inhabit these areas.

During your visit, encourage your students to look carefully for animals and their signs, such as tracks crisscrossing the pathways and nest cavities in trees. Ask them to listen carefully, too. Each diorama has a soundtrack depicting animals found in that habitat—some of which are not in the diorama, but are found in the wild in that environment. Keen observers will even notice how spring lags as they progress across our state from the Coastal Plain, where the trees are almost fully leafed out, up to the spruce-fir habitat, where patches of snow remain and the few deciduous species have not yet leafed out. You might suggest they compare the Piedmont's dogwood trees with those of the mountain cove.

How did we do it?

A committee of Museum staff, using input from many experts outside the Museum, worked with designers and fabricators to decide what would be represented and which stories we hoped to tell. We took springtime field trips to selected natural areas representing the chosen habitats over a three-year period to photo document plants and animals and to collect plant materials such as small trees and shrubs. We stripped off leaves, fumigated the plants to kill any organisms that might cause decay, and shipped them off to California, where artists repainted them and added artificial leaves. After Museum staff reviewed the work, the refurbished plants were shipped back to the Museum for installation.

Is it real?

The spruce and fir needles are real, as are many of the grasses—most other plant parts are artificial. All the flowers are artificial; some were made from molds of living plants. We manufactured the larger tree trunks by making molds of the bark of trees found at various sites across North Carolina, then constructing the trees from a plaster and fiberglass mixture. Final paint jobs added the realistic details. The leaf litter is real; we collected it from the appropriate field locations. Most of the mammals and birds are taxidermy mounts. We obtained the specimens from salvaged animals—those from road kills, window kills, and the like. The reptiles and amphibians are models made from casts of preserved specimens. You will find live animals such as fish, reptiles, and amphibians in all the tanks.

Exploring the dioramas

Bottomland hardwood swamp forest: The high water marks on the cypress and swamp tupelo gum trunks show how these environments are subjected to seasonal flooding. Plants and animals found along our Coastal Plain rivers such as the Roanoke and Cape Fear have adapted to this periodic change in water level. These areas also provide important wildlife habitat for species requiring large tracts of forest such as black bears and neotropical migratory birds. Dominant trees include bald cypress and swamp tupelo gum. Animal highlights include a family of wood ducks (with some ducklings just emerging from their tree cavity nest), a green heron ready to strike at an unsuspecting minnow, and a great blue heron about to enjoy a meal of sunfish. Two barred owls watch over the scene while several species of warblers go about finding food. Inside a large hollow tree, four Eastern big-eared bats are roosting.

Longleaf pine savanna: The blackened tree trunks and ground debris hint at the major theme of this area—the role of fire in maintaining this incredibly diverse habitat. More species of plants exist in a longleaf pine savanna per unit area (on a small scale) than in almost any other habitat. Periodic fire is essential in maintaining this diversity. Without it, shading shrubs and trees quickly take over, crowding out some of the more unusual plant species such as orchids and carnivorous plants. As one ecologist stated, “Taking fire out of the longleaf forest is like taking the rain out of the rain forest.”

For comparison's sake, one side of the diorama depicts an area that burned about three to four weeks ago, while the other side of the diorama shows an area that burned one to two years ago. All five groups of “insect-eating” plants are represented in the diorama: sundews, butterworts, bladderworts, pitcher plants, and Venus' flytraps. Many animal species are also dependent on this vanishing ecosystem, including the endangered red-cockaded woodpecker (look for the nest cavity) and Bachman's sparrow, a skulking ground nester. Another notable species is the black bear cub and sow near the edge of the pocosin—a plant community of thick evergreen vegetation. Dominant plants in the savanna include longleaf pine in its many stages of growth, wiregrass, and a variety of wildflowers including grass pink orchids, orange milkwort, and crow poison.

Piedmont forest: The state's most populated region is represented by a diorama that shows a forest in succession. One side of a stream depicts a 75- to 150-year-old oak-hickory forest. The other side shows a forest consisting of pine, red cedar, red maple, and other early colonizing species establishing itself in a farm field that was abandoned 20 to 30 years ago. Familiar plants include white oak, sweet gum, blackberry, Christmas ferns, and pink and yellow lady's slipper orchids. Look for deer, a sleeping opossum, a busy beaver, and two box turtles. A mating pair of rat snakes has attracted the attention of a scolding blue jay, a tufted titmouse, and a gray squirrel. Flying overhead, a red-tailed hawk clutches its squirrel prey while a dive-bombing crow follows closely. Lazily watching it all is a sleepy raccoon and several birds high in the live and dead white oak trees. A major focal point is a portion of a beaver pond and dam.

Waterfall: A 20-foot waterfall cascades into a brook trout tank in this area which tells the story of the steep rocky faces along our mountain slopes. The rock tells an important geologic story about the tremendous forces that shaped our state. A thrust fault similar to the one at Linville Falls is shown on the right side of the diorama, as is the fine powder known as rock flour, produced by the fault's grinding and erosive action. Just below the fault, a timber rattlesnake lies in wait for its next meal and a long-tailed weasel steps out into the open just above. High overhead, a flock of cedar waxwings descends onto a serviceberry tree. Other plants such as rhododendron, mountain laurel, and various grasses and wildflowers cling to the shallow soils of the rocky slopes.

Spruce-fir forest: North Carolina's highest elevations have evergreen forests more similar to those in Canada than to any other forest in our state. The cold, harsh conditions and short growing season found at elevations above 4,500 feet (such as Mount Mitchell and Grandfather Mountain) have allowed a unique assemblage of plants and animals to survive. The dominant trees at these high elevations are red spruce and fraser fir. The diorama tells the story of what is happening to these high-elevation forests—one side shows a healthy spruce-fir stand; the other shows a number of dead trees. The fraser fir is declining as a result of the balsam wooly adelgid, an exotic pest introduced in the 1950s. This tiny insect feeds on fraser fir tree sap, and by introducing a toxin, gradually kills heavily infested trees. Red spruce is also showing signs of decreased growth rates, believed to be due to increased air pollution in these high elevation forests. Increased pollution is also thought to further stress the fraser fir, making it even more susceptible to the adelgids. Look for a bobcat, two ravens, a least weasel with prey, a saw-whet owl (our smallest N.C. owl), and other birds, including juncos, a veery, and a red-breasted nuthatch.

Mountain cove forest: The final stop shows a serene forest cathedral rich in wildflowers. This diorama highlights diverse old growth forests found in a few places in our mountains, such as Joyce Kilmer Memorial Forest. Look for several neotropical migrant birds (a black and white warbler, a black-throated blue warbler, an ovenbird, a wood thrush, and a pair of scarlet tanagers). A deer and two chipmunks are surrounded by a colorful wildflower display showcasing species such as trillium, wild geranium, phlox, foamflower, bloodroot, and false Solomon's seal.

North Carolina Science Curriculum:

Areas of the North Carolina science curriculum addressed in the Mountains to the Sea exhibit hall include:

Strands

K-8

- Nature of Science
- Science as Inquiry
- Science and Technology
- Personal and Social Perspectives

Competency Goals

K-5

- Animal Growth and Adaptations
- Interdependence of Plants and Animals
- Plant and Animal Life Cycles
- Plant Growth and Adaptations
- Properties of Movement of Organisms and Objects
- Similarities and Differences in Plants and Animals
- Solid Earth Materials
- Weather

6-8

- Change or Constancy in Organisms and Landforms over Time
- Energy Flow through Ecosystems
- Population Dynamics

Floor Plan of the Museum



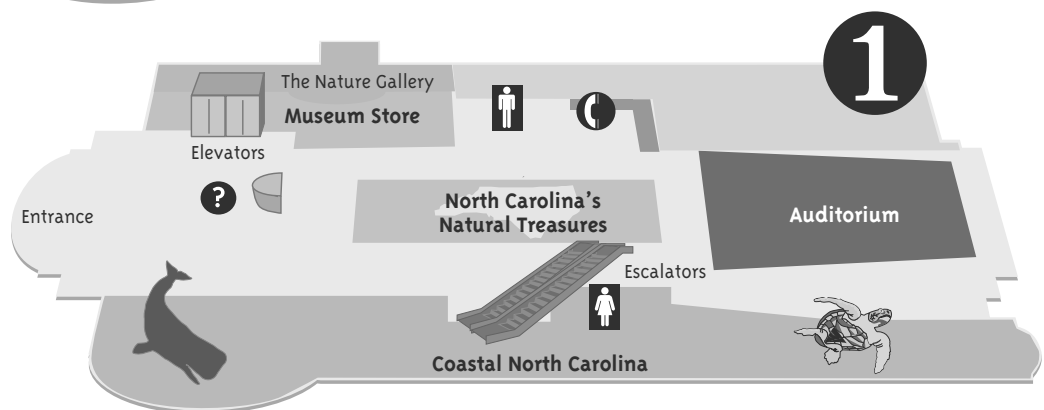
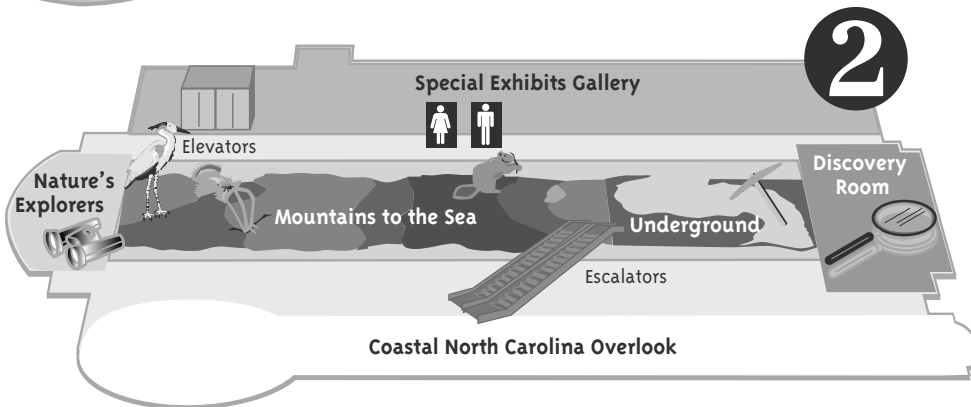
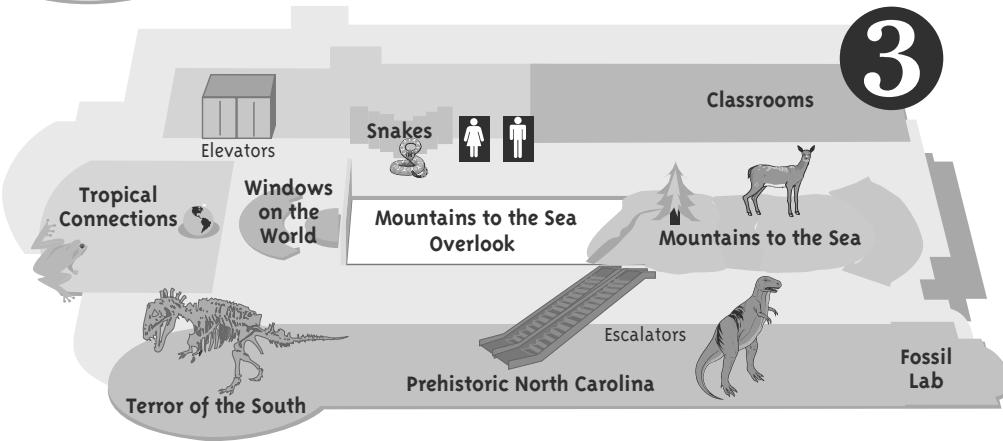
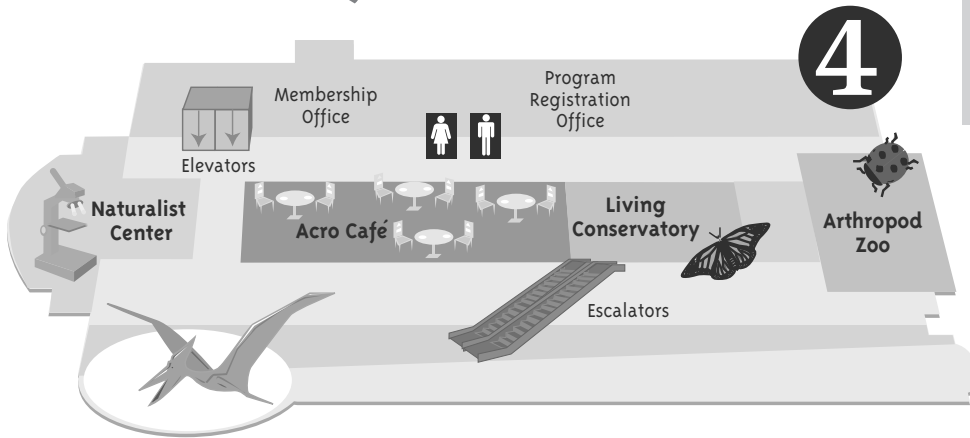
Restrooms



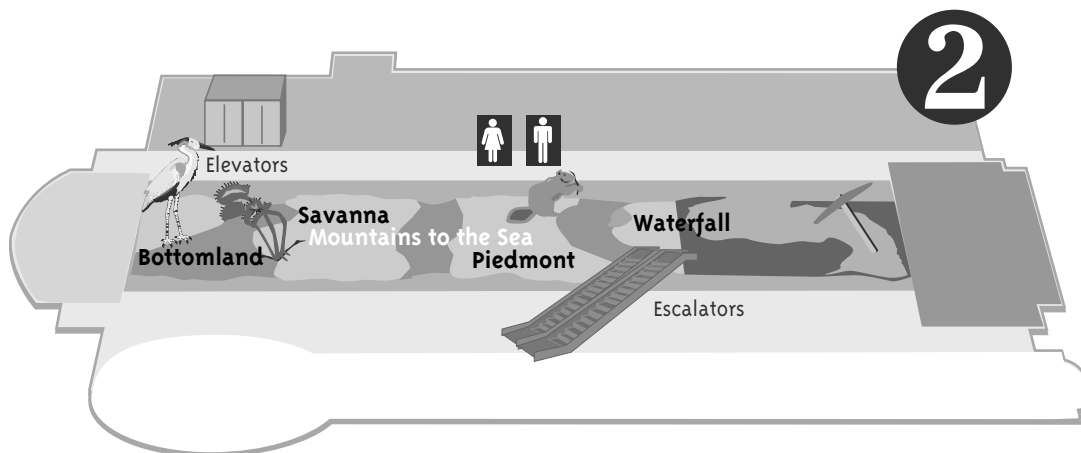
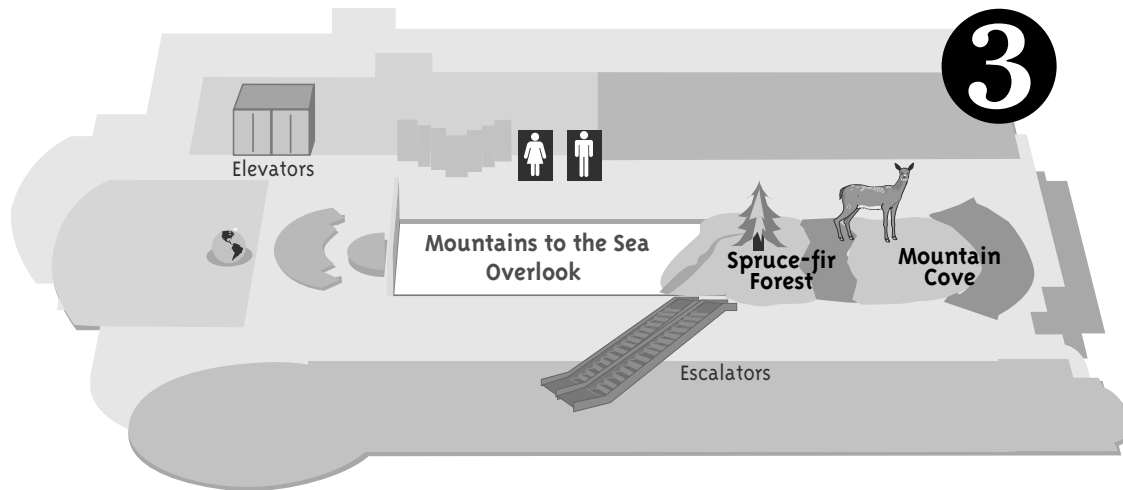
Information &
School Group Registration



Public Phones



Floor Plan of Mountains to the Sea Exhibit Hall



Introduction

to Animal Tracks and Signs

Mountains to the Sea Educator Activity Guide: Animal Tracks and Signs is designed to be used in conjunction with a visit to the Mountains to the Sea exhibit hall; however, many of the activities can be done even if your class never visits the Museum. While a wide variety of natural science topics are presented in the exhibit hall, this activity guide focuses on animal tracks and signs. The guide includes student activities to be done before, during, and after a visit to the Museum; background information on animal tracks and signs; and a list of useful references and resources. Use this activity guide to fulfill science curriculum strands and goals and to enrich your students' Museum experience.

Why study tracks and signs?

Wild animals can be found just about anywhere, in city parks, in natural areas, and even in your backyard. Think of the last time you went hiking through a forest or along a pond or lake. Some animals were undoubtedly easy for you to spot, but there were many others which you never saw. How do you know the animals were there at all? Most animals leave behind clues. By knowing what to look for and where to look, you can be a nature detective and discover what animals live in your area.

What do tracks and signs tell us?

The tracks and signs an animal leaves behind are keys to learning where that animal lives, how it hunts, when it travels, and what it eats. The combination of tracks and signs can tell a story. For example, if you hike near a river and find an area filled with otter tracks, you know that an otter has been there. If you find scat filled with scales near the tracks, you can hypothesize that the otter ate a fishy meal. You may even find an impression in the river bank where the otter playfully slid down the bank into the water. When you put all of these signs together, they can help you recreate the otter's activities.

What are animal signs?

Animal signs may be as obvious as a beaver dam or as obscure as the nibbled end of a twig. With a bit of practice and a good field guide, you can often match the sign with the animal that left it behind. Some common animal signs are described below. Keep in mind that the activities contained in this guide focus on signs that are easily interpreted by humans.

Tracks

Definition: The footprints of an animal.

Tracks are commonly found clues that you can use to identify an animal and study its behavior. The shape of the track can reveal if the animal has toes, claws, or hooves and may help determine the animal's identity. The placement and number

of tracks can give you insight into the animal's behavior. You might find one track, a series of tracks, a heavily traveled trail, or an area of activity. A raccoon, for example, may wander along a stream bank, stop to dig up clams, and stay to eat them, leaving behind tracks where it walked and sat. There might even be empty clam shells for you to interpret.

Scat

Definition: The feces of an animal.

Every animal leaves behind scat. The placement, shape, and contents of scat can tell you what type of animal left it. The scat of carnivores commonly contain undigested bits of prey, such as fur, bone fragments, or fish scales. Herbivores, such as rabbits and deer, leave pellets of tightly packed plant material. An omnivore's scat can have practically anything in it and is often the most difficult to identify because of the animal's opportunistic diet. Many times, identifying an animal from its scat alone is difficult because the diets of most animals change with the seasons, which changes the appearance and contents of their scat.

Food caches, remains, or kill sites

Definition: Areas where food is stored or left over from a feeding.

You can identify many animals by observing how and what food is stored, by examining the bits and pieces of food left behind, or by studying the clues left at a kill site. Nuts stored at the base of trees or in the ground may indicate the actions of a squirrel. Beavers leave their mark on branches and twigs where they have carefully chewed off the bark. Owls cough up "pellets," wads of indigestible bits of prey like bones, teeth, or feathers. A kill site, where a predator has killed and eaten its prey, may show signs of a struggle. These areas may have patterns in the dirt indicative of a scuffle, broken branches, scattered bones, feathers, bits of exoskeletons, dried blood, or large pieces of carcass. A common example of a kill site is a spider web, where silk-wrapped exoskeletons from past victims litter the area in and around the web.

Nests and home sites

Definition: A shelter of some kind; may be naturally occurring, built, or excavated.

Most animals use some type of shelter at various times during their lives. Animals may live in shelters year round, during the breeding season, or in the winter. Animals can build their shelters in the trees, in the water, or in the ground. Examples of shelters built by animals are bird nests, hornet nests, beaver lodges, and chipmunk burrows. Some animals utilize naturally occurring dens or cavities within trees, hollow logs, caves, or brush piles. The big-eared bat, for example, roosts in tree cavities. Other animals make changes or additions to naturally occurring nest sites. For example, wood ducks commonly build nests inside existing tree hollows.

Scent

Definition: An odor an animal leaves behind, such as urine or musk.

Many animals use scent to mark their territories, attract mates, claim kill sites, or defend themselves. Depending on species, animals may use urine, feces, or secretions from scent glands. Most animals place their scent on existing landmarks such as trees or rocks. The beaver, however, builds a special mound and marks it with castoreum (a scent gland secretion). Canines and felines mark territory boundaries with urine. A skunk sprays a foul-smelling liquid in self-defense to distract a predator while it makes a hasty escape.

Sound

Definition: A sound an animal makes, either through vocalization or with another part of its body.

Animals use sound to communicate, to mark territory, to warn others, or to attract a mate. Some examples are birds singing, crickets chirping, or beavers slapping their tails on the water. Although not all of these sounds are vocal, they are distinct and recognizable.

Plant damage

Definition: Plants that have been altered by animal behavior.

Animals cause damage to plants for several different reasons. Animals such as bears or bobcats mark their territories by clawing and biting the bark off of trees. This type of damage is called a scrape. Male deer remove the blood-rich velvet from their growing antlers by rubbing them against a tree, leaving some blood and velvet clinging to the bark-stripped tree. This type of damage is called a rub. Beavers leave stumps and piles of wood chips behind when they fell a tree for food or for use in their lodge or dam. Squirrels shred the bark off trees and use it in their nests. Even something as simple as the way a leaf was nibbled can distinguish whether a deer, a rabbit, or a caterpillar fed in the area.

North Carolina Science Curriculum Correlations

North Carolina Science Curriculum Strands

Activities in this guide use strategies outlined in the N.C. Science Curriculum Strands to teach students about a wide variety of animal tracks and signs topics. Refer to the chart below for specific activity/strand correlations.

		Nature of Science	Science as Inquiry	Science and Technology	Personal & Social Persp.
ACTIVITIES	K-2	Animals and Their Signs	K	K-2	
		Do You Hear What I Hear?	K, 2	K-2	K, 1
		Animal Signs	K	K-2	
		Call of the Wild	K	K-2	
		Interpreting Tracks	K, 2	K-2	K-2
		Who Lives at Your School?	K, 2	K-2	K-2
	3-5	Territory Map	3, 5	3-5	4, 5
		Mystery Scat	3, 5	4, 5	
		Animal Scat	3	4, 5	
		All About Beavers	3	4, 5	
		Owl Pellets	3, 5	3-5	4, 5
		Track Story	3	3-5	5
	6-8	Who Am I?, part 1	6-8	6-8	6
		Who Am I?, part 2	6-8	6-8	6
		Who Am I?, part 3	6-8	6-8	6

North Carolina Science Curriculum Competency Goals

The activities in this guide can be used to fulfill many of the competency goals described in the N.C. Science Curriculum. For specific activity/goal correlations, refer to individual activities.

Animals and Their Signs

Pre-visit Activity

Suggested Grade Level: K-2

Skills Practiced

- Using different media to create art projects
- Improving fine motor coordination
- Manipulating small objects

N.C. Science Curriculum Competency Goals

Kindergarten

1.02 Similarities and differences in animals

Grade 1

1.02 Needs of animals

Objective

Students will be able to recognize different animal signs.

Background

Animals live all around us, in our parks, on our school grounds, and even in our backyards. We often fail to see these animals when we explore such areas. Why can't we find them? Perhaps we look for them at the wrong time of day. Maybe they see us first and hide. Fortunately, animals leave behind plenty of clues that tell us who they are, where they live, and what they do.

Signs that tell us that animals are in the area include tracks (footprints), scat (feces), food remains (e.g., pile of feathers, empty clam shells), food caches (e.g., nuts stored in tree hollows), and plant damage (e.g., leaf nibbled by an insect, claw marks on tree bark). Structures built or used by animals such as spider webs, anthills, bird nests, or tree cavities also indicate that animals live nearby.

Exhibit Hall Connections

The animals referred to in this activity can be found on display in the habitat dioramas located throughout the Mountains to the Sea exhibit hall.

Materials

- Animals and Their Signs activity sheet
- tape
- scissors
- crayons

Teacher Preparation

1. Before class starts, make enough copies of the activity sheet for every student in your class.
2. Gather the remaining materials.
3. *Answers to the activity sheet: crayfish—mud chimney; black bear—large mammal track; great blue heron—large bird track; beaver—dam; pileated woodpecker—tree cavity; red squirrel—chewed cone*

Activity

1. Hold a class discussion during which you and your students brainstorm what kinds of signs animals might leave behind. (See Background for ideas.)
2. Distribute the activity sheets, scissors, tape, and crayons to your students.
3. Instruct your students to cut out the animals on the left side of the activity sheet. Next, have your students determine which animal makes which sign. Tape each animal on top of its appropriate sign so that the animal pictures can be lifted up to reveal the signs underneath.
4. Students may color the animals and their signs.

Extensions

Using new copies of the activity sheet, make animal signs flash cards using 3"x5" index cards—cut out the pictures of the animals and the animal signs and then glue or tape them to index cards. Have students play games such as Concentration, Memory, or Go Fish using the flash cards.

References and Resources

Books for students

Animal Tracks, by Arthur Dorros

Crinkleroot's Book of Animal Tracking, by Jim Arnosky

How to Be a Nature Detective, by Millicent Selsam

I See Animals Hiding, by Jim Arnosky

Keep Looking!, by Millicent Selsam

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes

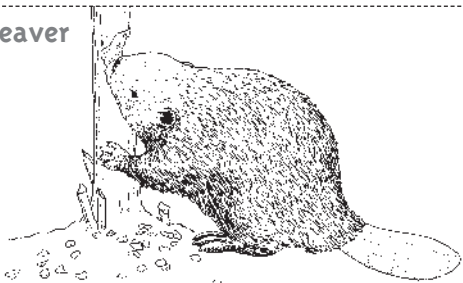
North Carolina Wild: Wildlife Profile Series, published by the

North Carolina Wildlife Resources Commission

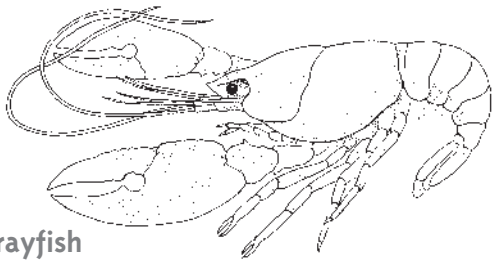
Tracking and the Art of Seeing: How to Read Animal Tracks, by Paul Rezendes

Animals and Their Signs Activity Sheet

beaver



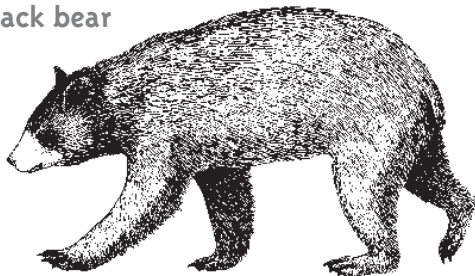
crayfish



red squirrel



black bear



pileated woodpecker



great blue heron



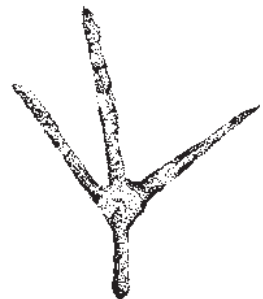
large mammal track



tree cavity



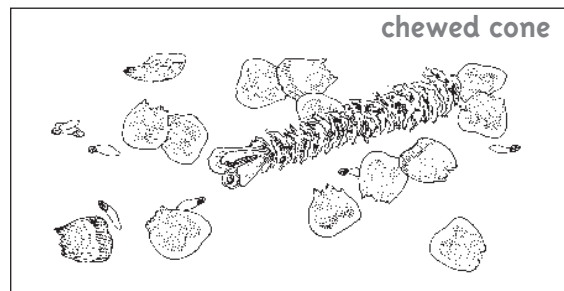
large bird track



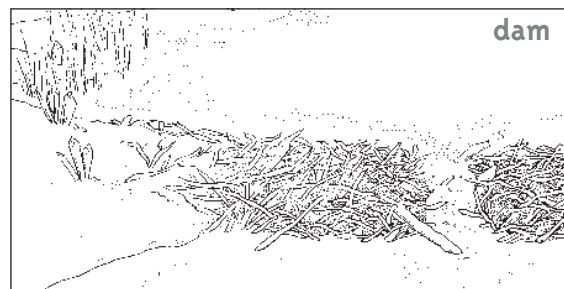
mud chimney



chewed cone



dam



Cut along dotted lines.

Do You Hear What I Hear?

Pre-visit Activity

Suggested Grade Level: K-2

Skills Practiced

- Improving fine motor coordination
- Observing
- Listening

N.C. Science Curriculum Competency Goals

Kindergarten

- 1.02 Similarities and differences in animals
- 3.02 How objects sound

Grade 1

- 1.04 Identify local environments that support the needs of N.C. animals

Grade 2

- 4.0 Concepts of sound

Objective

Students will use a variety of materials to make different animal sounds.

Background

An excellent way to find animals is to listen for them. Animals use a variety of sounds—whistles, barks, snorts, rattles, clicks—to attract mates, defend territories, warn others of danger, scare away predators, and find food. They also make noise while they go about their daily lives—woodpeckers drill holes in trees in search of insects, bees buzz around flowers, squirrels rustle leaves as they scamper from tree to tree. You can hear different sounds depending on the time of day and the season. Early in the morning on spring days is a great time to listen to birds sing as they defend their territories and attract mates. Summer evenings are filled with the calls of crickets and frogs.

Exhibit Hall Connections

The animals referred to in this activity can be found on display in the habitat dioramas located throughout the Mountains to the Sea exhibit hall.

Materials

- 4 empty 35 mm film canisters with lids
- 1/2 cup uncooked white rice
- 4 1/4-inch wide rubber bands
- 4 cardboard shoe boxes without lids
- 4 plastic margarine tubs without lids
- 4 markers
- 4 2-liter plastic bottles
- band-aids (one for each student)
- 4 12-inch pieces of cotton string
- 4 16-oz plastic party cups
- 1 1/2-inch thick kitchen sponge
- 4 plastic dishpans (or classroom sink)
- water
- 4 spatulas
- Animal Sounds activity sheet
- crayons
- scissors

Teacher Preparation

1. The materials listed above will be used to make the following animal sounds: southern cricket frog, timber rattlesnake, green frog, pileated woodpecker, white-tailed deer, wild turkey, and beaver.
2. Refer to the table on page 13 and put together four of each type of animal sound instrument. *Note: Since the amount of time needed to make the different instruments varies, it is recommended that you, not your students, put the instruments together.*
3. Set up seven animal sound stations around your classroom. Each station should be supplied with four identical animal sound instruments, a picture of the animal responsible for making the sound, and written instructions on how to make the sound using the instrument.
4. Make enough copies of the Animal Sounds activity sheet for every student in your class.

Activity

1. Hold a class discussion during which you and your students brainstorm what sounds animals make (barks, whistles, croaks, rattles); when they make their sounds (in the morning, at night, all the time); and why animals make sounds (territory, courtship, warning, finding food).
2. Hand out Animal Sounds activity sheets and discuss the sound each animal makes. Your students may color the pictures.
3. Send four students to each station and give them time to practice with the animal sound instruments. Make sure they understand the instructions on how to make each animal's sound. *Note: Remind your students to wrap fresh band-aids around the mouths of the bottles before making the white-tailed deer snort. They should also remove and discard the used band-aids before leaving the white-tailed deer station.*
4. Have the students rotate through all seven stations.
5. After each student has had the opportunity to make all the animal sounds, play a listening game during which the students close their eyes while you select an instrument and make a sound. Have your students tell you where the sound came from and what "animal" made it.

Extensions

Have your students create an imaginary animal and an instrument that makes this animal's sound. Ask them to write a story or develop a puppet show about the animal.

Go to different areas on your school grounds (fields, natural areas, woods, parking lots, playground) and listen for animal sounds. Bring along a tape recorder and make a school grounds sounds tape. Do you hear different animal sounds at the different areas of the school grounds? Does one area have more sounds than the other? Visit these areas in the morning and in the afternoon. Do you hear different sounds at different times of the day? Make a chart or graph that shows how many animal sounds you hear in different sections of your school grounds.

Listen to the animal sounds tapes recommended in the References and Resources section.

References and Resources

Books for students

A Time for Singing, by Ron Hirschi

How Animals Talk, by Susan McGrath

Sound resources

A Guide to Night Sounds, by Lang Elliot

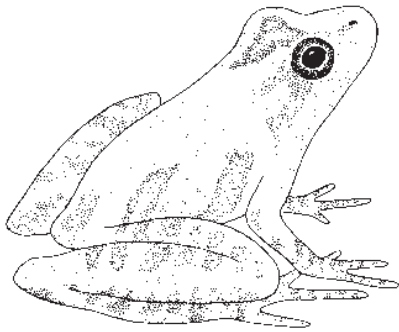
Birding by Ear: A Guide to Bird-song Identification,

by Richard Walton and Robert Lawson

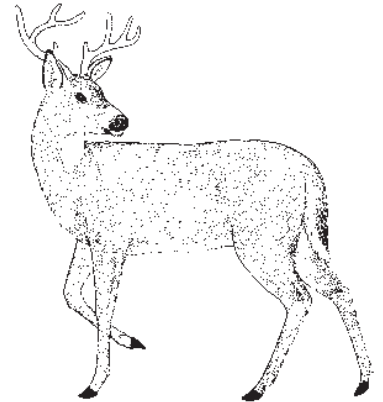
The Calls of Frogs and Toads, by Lang Elliot

Animal	Items needed for one student to make the sound (and assembly instructions)	How to make the sound
southern cricket frog	two pennies	Hold a penny between the thumb and forefinger of each hand and click together at a rate of 4 clicks per second with a 2 second pause and then 4 more clicks, etc.
timber rattlesnake	one film canister with lid and uncooked rice (Half fill the canister with rice and snap lid in place.)	Shake the canister rapidly.
green frog	one cardboard shoe box without lid and one ¼-inch wide rubber band (Put rubber band around the middle of the box.)	Pluck the section of rubber band that lies over the box opening once, pause for 3-5 seconds, and then pluck again.
pileated woodpecker	one plastic margarine tub without lid and one marker	Hold the tub in one hand and rapidly tap the marker back and forth against the inner sides of the tub
white-tailed deer	one plastic 2-liter bottle and band-aids (Cut off and keep the top four inches of the bottle. Wrap band-aid around mouth of bottle before making the sound. Remove and replace band-aid after each student.)	Forcefully exhale a short breath through the mouth of the bottle.
wild turkey	one 16-oz plastic party cup with small hole in bottom, 12" cotton string, and 1" x 3" strip of slightly moistened kitchen sponge (Pull string through hole so that 11" hang through the opening of the cup and 1" remains at the outside bottom of the cup. Tie a knot in the 1" piece of string.)	Fold sponge in half. While holding the cup upside down, tightly pinch the long piece of string between the two halves of the sponge and, in short bursts, pull the sponge down the string.
beaver	one plastic dishpan (or sink in classroom) filled ⅓ with water and one spatula	Slap the water in the dishpan with the flat side of the spatula.

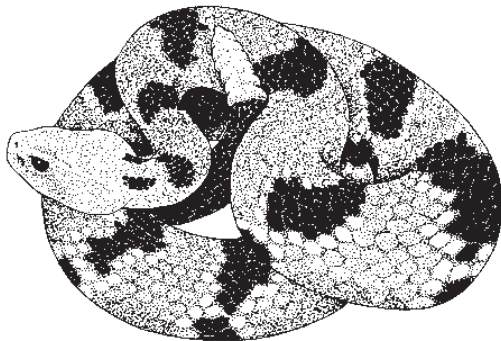
Animal Sounds Activity Sheet



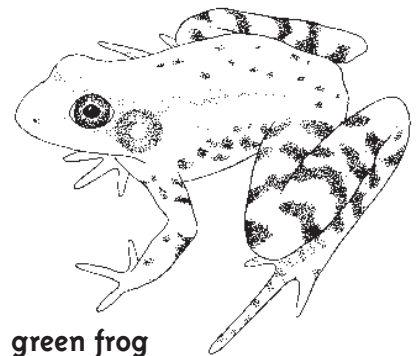
southern cricket frog



white-tailed deer



timber rattlesnake



green frog



pileated woodpecker



wild turkey



beaver

Animals Signs

Exhibit Hall Activity

Suggested Grade Level: K-2

Skills Practiced

- Observing
- Reporting data

N.C. Science Curriculum Competency Goals

Kindergarten

- 1.02 Similarities and differences in animals
- 3.03 Movement of organisms

Grade 1

- 1.02 Needs of animals
- 1.04 Identify local environments that support the needs of N.C. animals
- 4.01 Way things move

Objective

Students will be able to identify several North Carolina animals and the habitats in which they live.

Background

Animals leave behind all sorts of clues for us to find and interpret. To discover what animals are around and how they spend their time, we look for signs such as tracks, nests, and food remains. By examining tracks, we can determine what animal made them. We can also hypothesize what the animal was doing at the time the tracks were made. Birds and other animals can be identified by the shape, size, and location of their nests and home sites, as well as by the materials used to build the structures. If we come across food remains, we can begin to identify the animal that ate the food by observing what parts of the food were left behind and how and where the food was eaten.

As you and your students explore the habitat dioramas located in the Mountains to the Sea exhibit hall, be on the lookout for North Carolina's animals and their signs.

Materials

- Animals and Their Signs activity sheet
- tape
- scissors
- index cards

Teacher Preparation

1. Determine into how many groups you will divide your class and then make that many copies of an unmarked activity sheet used during the Animals and Their Signs pre-visit activity on page 10.
2. Each group will need a complete set of animal cards when they arrive at the Museum. To make the cards, cut out the animals and their signs from the copies of the activity sheet. Using one index card per animal and its sign, glue or tape the animal on the front of the card and then secure the animal's sign on the back of the card.
Note: If your students are able and there is enough time, have each group make their own set of cards.
3. Bring the animal cards to the Museum.

4. In case your students have difficulty locating the animals, here is a list of the animals and their habitat locations in the exhibit hall:

crayfish	Bottomlands
black bear	Savanna
great blue heron	Bottomlands
beaver	Piedmont
pileated woodpecker	Bottomlands
red squirrel	Spruce-Fir Forest

Activity

1. When you enter the Mountains to the Sea exhibit hall, give each group its animal cards.
2. Instruct the groups to search for the animals and signs while they explore the exhibit hall.
3. When your students finish exploring, discuss the results of the search with them. Did they find all the animals? Where were the animals? What were they doing in the dioramas? Did your students learn any interesting facts about any of the animals?

Extensions

Examine the animal tracks sculpted into the walkways that wind through the habitat dioramas. Do your students see any tracks they recognize?

Each habitat diorama is filled with animals and their signs. Pick a diorama and have your students find as many animals and signs as they can.

During the trip back to your school, have your students look for signs of human activity (e.g., litter, grass clippings).

References and Resources

Books for students

Animal Tracks, by Arthur Dorros
Crinkleroot's Book of Animal Tracking, by Jim Arnosky
How to Be a Nature Detective, by Millicent Selsam
I See Animals Hiding, by Jim Arnosky
Keep Looking!, by Millicent Selsam

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes
North Carolina Wild Places, edited by Lawrence S. Earley
North Carolina Wild: Wildlife Profile Series, published by the North Carolina Wildlife Resources Commission

Call of the Wild

Exhibit Hall Activity

Suggested Grade Level: K-2

Skills Practiced

- Observing
- Listening

N.C. Science Curriculum Competency Goals

Kindergarten

- 1.02 Similarities and differences in animals
- 3.02 How objects sound

Grade 1

- 1.04 Identify local environments that support the needs of N.C. animals

Grade 2

- 4.0 Concepts of sound

Objective

Students will practice the listening, observation, and identification skills developed during the Do You Hear What I Hear? pre-visit activity.

Background

Animals make a variety of sounds for a variety of reasons. They chirp, whistle, sing, bark, growl, thump, snort, hiss, and rattle to communicate with one another about all kinds of topics, from courtship to defense. As they go about their business, animals rustle, splash, tap, scratch, and buzz their way through the day and night. By listening carefully, we can learn about the animals all around us.

As you and your students explore the Mountains to the Sea exhibit hall, listen for the sounds of North Carolina's animals.

Materials

- Animal Sounds activity sheets

Teacher Preparation

1. Make sure students bring the Animal Sounds activity sheets used during the Do You Hear What I Hear? pre-visit activity. If you divide your class into groups, make sure each group has an activity sheet.
2. In case your students have difficulty locating the animals, here is a list of the animals and their habitat locations in the exhibit hall:

southern cricket frog*	Savanna (at the edge of small pool)
timber rattlesnake	Waterfall
green frog	Piedmont
pileated woodpecker	Bottomland
white-tailed deer	Mountain Cove and Piedmont
wild turkey	Bottomland
beaver	Piedmont

*A southern cricket frog is about the size of a quarter.

Activity

1. Before arriving at the Museum, prepare your students for what they will see in the Mountains to the Sea exhibit hall. Remind them that all of the animals they learned about during the Do You Hear What I Hear? pre-visit activity can be found in the exhibit hall.
2. Using the Animal Sounds activity sheet as a checklist, have your students look for the animals whose sounds they made during the Do You Hear What I Hear? pre-visit activity.

Extensions

Each major habitat diorama plays a unique soundtrack that contains the calls and noises of animals found in the particular habitat. Pick a diorama and take a few minutes to listen for the sounds playing in the background. Have your students try to imitate the sounds they hear.

You can visit two different animal sound interactive displays in the Mountains to the Sea exhibit hall. Students can learn about frog calls and nocturnal sounds at these displays. The frog call interactive display is located near the Bottomland habitat diorama. The nocturnal sound interactive display is located in the Nocturnal Life exhibit near the Mountain Cove diorama.

During the trip back to your school, have your students close their eyes and listen for sounds of human activity (e.g., cars honking, people talking, radios playing). If possible on your return trip, play some of the animal sound tapes suggested in the References and Resources section.

References and Resources

Books for students

A Time for Singing, by Ron Hirschi
How Animals Talk, by Susan McGrath

Sound resources

A Guide to Night Sounds, by Lang Elliot
Birding by Ear: A Guide to Bird-Song Identification,
by Richard Walton and Robert Lawson
The Calls of Frogs and Toads, by Lang Elliot

Interpreting Tracks

Post-visit Activity

Suggested Grade Level: K-2

Skills practiced

- Observing
- Measuring
- Recording data
- Interpreting

N.C. Science Curriculum Competency Goals

Kindergarten

- 1.02 Similarities and differences in animals
- 3.03 Movement of organisms

Grade 1

- 4.01 Way things move

Objective

Students will be able to use tracks to determine the gait of their classmates.

Background

Tracks are the footprints of animals. They can be made as impressions in soft surfaces like mud or sand or left as muddy or watery prints on rocks, cement, or even wind-shields. A trackway is a series of footprints made by an animal as it moved from one place to another. You can use an animal's tracks and trackways to identify it, estimate its size, and determine how it was moving at the time (e.g., walking, running, hopping).

Materials

- 4-5 pairs of socks (cheap or old ones that will fit your students' feet without being too big)
- plastic dishpan or bucket half filled with water
- paved surface outside (e.g., sidewalk, basketball court)
- chalk
- 2 measuring tapes or yard sticks
- Track Data Sheet*
- pencil
- clipboard

**Depending on the ability level of your students, you may want to use the questions on this sheet to guide your students' interpretations of the tracks instead of having the students record data on the sheet.*

Teacher preparation

1. Select a paved surface away from foot and car traffic which does not become slippery when wet.
2. Gather the materials listed above.

Activity

1. Discuss with your students what tracks and trackways are and what you can learn by studying these animal signs (e.g., identity, size, and gait).
2. Go to the paved surface with your students. Bring the socks, dishpan with water, chalk, measuring tape, data sheet, pencil, and clipboard.

3. Ask for or select as many volunteers as you have pairs of socks. Have these students remove their own shoes and socks and put on the socks you provide. *Note: It is best if the student volunteers vary in shoe size. This will make matching the volunteers with their tracks easier.*
4. Instruct two or three students to measure each volunteer's feet and record the information on the Track Data Sheet.
5. While the feet measurements are being taken, have two or three students use the chalk to draw two lines approximately 15 feet apart on the paved surface.
6. Place the dishpan with water near one of the chalk lines. Ask the volunteers to stand near the dishpan and the remaining students to stand near the second chalk line, but not in between the two lines.
7. Have the volunteers get their feet and the socks wet.
8. While the rest of the students have their backs to the two chalk lines, select one of the volunteers to go from the nearest chalk line to the farthest chalk line and back to the nearest chalk line. The volunteer can run, walk, hop, etc., but should not change his or her gait in the middle of the trackway.
9. When the volunteer has finished moving between the two lines and has rejoined the other volunteers, allow the rest of the students to turn around and record their observations on the data sheet. *Note: The tracks in the middle of the trackway will give the most accurate measurement of the volunteer's foot.*
10. Repeat steps 8 and 9 until all volunteers have made a trackway. While waiting for their turn to make a trackway, the volunteers may need to re-wet their feet several times during the course of this activity.

Extensions

Make a Track Box to put outside your classroom. See instructions on page 45.

References and Resources

Books for students

Animal Tracks, by Arthur Dorros

Crinkleroot's Book of Animal Tracking, by Jim Arnosky

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes

Tracking and the Art of Seeing: How to Read Animal Tracks, by Paul Rezendes

Track Data Sheet

Volunteer name

Length of right
foot (in inches)

Length of left
foot (in inches)

Trackway #	1	2	3	4	5
How many tracks are in this trackway?					
Are there right foot and left foot tracks in this trackway?					
How long is the right foot track?					
How long is the left foot track?					
Which volunteer do you think made this trackway?					
What was the volunteer's gait?					

Who Lives at Our School?

Post-visit Activity

Suggested Grade Level: K-2

Skills practiced

- Observing
- Recording data
- Use and care of equipment

N.C. Science Curriculum Competency Goals

Kindergarten

- 1.02 Similarities and differences in animals
- 3.02 How objects sound
- 3.03 Movement of organisms

Grade 1

- 1.02 Needs of animals
- 1.04 Identify local environments that support the needs of N.C. animals
- 4.01 Way things move

Grade 2

- 4.0 Concepts of sound

Objective

Students will be able to identify areas on their school grounds where animals live.

Background

School grounds are more than places to learn about reading, writing, and arithmetic. They are home to a multitude of animals that mostly go unnoticed by students and teachers. These animals make their homes on buildings, in trees, and under shrubs. They may search for food under eaves, on playgrounds, or in nearby natural areas. Signs of their presence can be found just about everywhere, if you know how to look.

Tracks, scat, food remains, nests, webs, and sounds are some of the animal signs that can be found on your school grounds. Animals such as song birds, mud daubers, spiders, ants, and squirrels are just a few of the creatures you and your students can study during a mini-field trip. Grab some field equipment and discover who lives on your school grounds.

Materials

- hand lenses (with magnification of at least 2X)
- catching jars (clear plastic jars with wide mouths and small air holes punched in the lids)
- spritzer bottles filled with water (to lightly spray spider webs)
- white plastic dishpans
- field guides (see References and Resources list below)

Teacher preparation

1. Assemble field equipment listed above.
2. Survey your school grounds and locate three to four sites that are likely to contain a good number of animals or their signs (e.g., natural areas with trees and shrubs, buildings, eaves). *Note: Early fall is a great time to find animals and their signs.*

Activity

1. Review with your students the different types of animal tracks and signs they have learned about (sounds, tracks, food remains, homes). Prepare your students for their school grounds field trip by describing which sites you will visit. Have them brainstorm what they might see, hear, or find during the trip.
2. Pass out the field guides and equipment. Demonstrate how to use the equipment (if necessary) and discuss how to catch and release animals safely (for their safety and the animal's safety). Tell them to look at, not catch, stinging insects. Also remind them not to leave catching jars in the sun.
3. Explore the sites with your students. Remind them to look and listen for animals and their signs. Use the dishpans to hold any objects found (e.g., feathers, insect sheds, nibbled leaves); the white background makes it easier for the students to examine the objects. *Note: Do not allow your students to disturb bird nests.*
4. Return all animals and objects to their original locations before returning to the classroom.
5. When you return to the classroom, make a list with your students of the animals and the animal signs you and your students found or heard.

Extensions

Start a classroom journal in which you and your students enter observations, drawings, thoughts, and questions about the animals and animal signs found on your school grounds throughout the school year.

Bring a tape recorder along with you on your field trip and make a school grounds sounds tape.

Make an Animal Tracks and Signs Resource Box using materials collected from your school grounds. See page 46 for instructions and suggestions.

References and Resources

Books for students

Birds, by H.S. Zim and Ira N. Gabrielson

Butterflies and Moths, by R.T. Mitchell and H.S. Zim

How to Be a Nature Detective, by Millicent Selsam

I See Animals Hiding, by Jim Aronsky

Insects, by H.S. Zim and C. Cottam

Keep Looking!, by Millicent Selsam

Peterson's First Guides: Caterpillars, by A.B. Wright

Reptiles and Amphibians, by H.S. Zim and H.S. Smith

Spiders and Their Kin, by H.W. Levi and L.R. Levi

Books for teachers

Classroom Creature Culture: Algae to Anoles, published by
National Science Teachers Association

Territory Map

Pre-visit Activity

Suggested Grade Level: 3-5

Skills practiced

- Collecting data
- Reporting data
- Using maps

N.C. Science Curriculum Competency Goals

Grade 4

1.0 Animal growth and adaptation

Objective

Students will learn that animals use scent to mark their territories.

Background

Scent is an animal sign that often goes undetected by humans—unless your male cat sprays or your dog plays with a skunk. Some animals use scent to defend themselves from predators. Other animals use scent to attract mates or to mark territories. When a scent is used for defense, the smell produced is highly offensive to any animal unlucky enough to come within range. In cases where scent is used to communicate specific information, such as territorial boundaries, the smell is less noticeable, except by members of the same species, and holds no meaning for most other animals.

Animals that use scent to establish territories leave their scent in a variety of ways. Dogs and cats, both wild and domestic, spray urine on landmarks such as trees and posts. Rabbits have scent glands under their chins and deposit their scent by rubbing their chins on objects. Beavers build structures called scent mounds out of mud and sticks and mark the mounds with castoreum, an oily substance secreted from glands located at the base of the tail.

Exhibit Hall Connections

A beaver scent mound is on display in the Piedmont habitat diorama. Additional information on scent mounds can be found on nearby text panels.

Materials

- 20-30 black film canisters with lids (or similar opaque containers)
- nail and hammer
- 20-30 cotton balls
- 4-5 different scents (e.g., vanilla extract, peppermint extract, perfume)
- pencils
- clipboards

Teacher preparation

1. Draw a map of the classroom and include easily identified objects (e.g., chalkboard, teacher's desk, globe, fish tank).
2. Decide whether to set up four or five territories in the room. Each territory requires a unique scent. Gather the necessary number of different scents.
3. Make as many copies of the classroom map as you have territories plus one extra.
4. Decide on the size and location of the territories. Draw the territories on a blank map: this will become the master territory map. *Note: Territories may share boundary lines, but should not overlap. In the interest of time, space, and materials, each territory should be marked with four to five scent canisters only. See page 22 for a sample territory map.*
5. Make five to six canisters per scent. Each group will be given one scent canister so that they know what scent was used to mark their territory. The remaining canisters will be used to establish the territories in the room. To prepare the scent canisters, use a hammer and nail to make four holes in the lids of the film canisters. Wet cotton balls with the desired scents, place one cotton ball in each canister, and cover the canisters with lids.
6. Refer to the master territory map and place the appropriate scent canisters at their proper locations.

Activity

1. Discuss with your students how and why animals use scent. Describe how animals use scent to mark territories.
2. Explain that you have divided the classroom into several different territories and that they will work in groups to determine where those territories are.
3. Divide the students into groups and distribute blank classroom maps, pencils, and clipboards to each group.
4. Have the students review the map and make sure they can orient themselves in the room using the map.
5. Give each group a different sample scent canister and tell them to become familiar with their scent.
6. Instruct the groups to determine their classroom territories by finding all the canisters that match the scent in their sample and marking the locations of these canisters on their maps.
7. When all the groups are done, have each group report on the location of their territory.

Extensions

Allow students to make their own territories using the scent canisters.

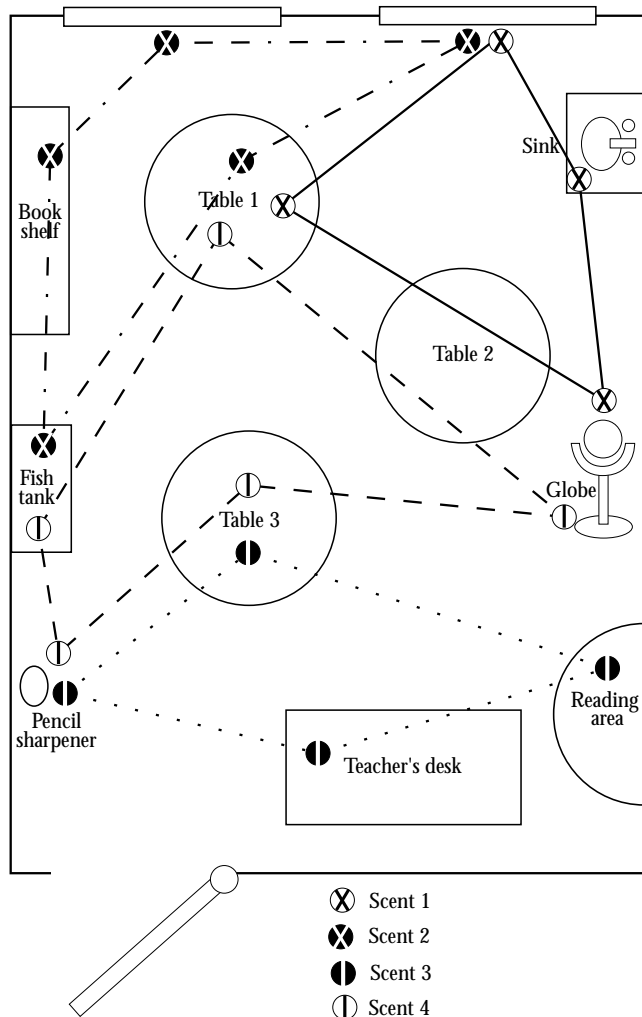
Investigate other methods animals use to mark their territories. In the spring, take a mini-field trip on your school grounds and listen for birds defending their territories with song.

References and Resources

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes

Sample Territory Map



Mystery Scat

Pre-visit Activity

Suggested Grade Level: 3-5

Skills practiced

- Observing
- Inferring

N.C. Science Curriculum Competency Goals

Grade 4

1.0 Animal growth and adaptation

Grade 5

1.0 Interdependence of plants and animals

Objective

Students will be able to identify an animal from its scat.

Background

The presence of scat (animal feces) is a sign that an animal has been in the area. If you take the time to study scat, it can tell you many things about the animal that left it—its identity, its diet, its size. If the scat is relatively small and uniform in shape and texture, it is most likely from a herbivore. A carnivore's scat often will contain fur and bits of bone, while an omnivore's scat will contain both plant and animal remains. Seasonal changes in diet are reflected in an animal's scat.

Exhibit Hall Connections

The animals referred to in this activity can be found on display in the habitat dioramas located throughout the Mountains to the Sea exhibit hall. In addition, an animal scat display is located near the Savanna habitat diorama.

Materials

- Mystery Scat story
- pencils

Teacher preparation

1. Make a copy of the Mystery Scat story for each student.
2. For this activity, your students will read a story and fill in the missing information based on clues given in the story. The correct answers in order of appearance in the story are river otter, great blue heron, black bear, eastern cottontail rabbit, and white-tailed deer.

Activity

1. Hold a class brainstorming session about animal scat. Why study it? What can it tell you? Where might it be found?
2. Pass out the Mystery Scat story and have your students solve the scat mysteries.
3. Review the sheets with your students.

Extensions

Take a mini-field trip around your schoolgrounds and look for different kinds of animal scat.

Make a scat field guide which includes drawings of animals found on your school grounds and their scat.

Purchase a set of rubber animal scat models for your classroom and include it in an Animal Tracks and Signs Resource Box (see page 46 for details).

References and Resources

Books for students

Secrets of a Wildlife Watcher, by Jim Arnosky

Tracks, Scat and Signs, by Leslie Dendy

Animal Tracks and Traces, by Kathleen Kudlinski

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes

Tracking and the Art of Seeing: How to Read Animal Tracks, by Paul Rezendes

Scat resources

Acorn Naturalist (800.422.8886) sells rubber scat.

Mystery Scat Story

Read the following story and, using the clues given, determine the identity of the animals whose scat was found. Fill in the blanks with the animals listed at the end of the story.

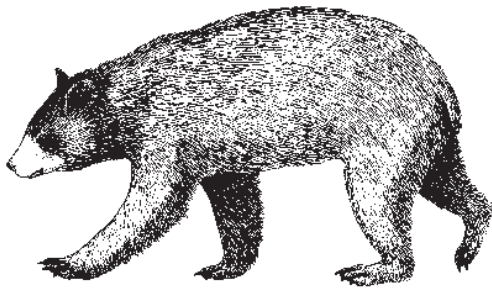
One spring afternoon, my friend, Sam, and I went for a walk on my grandpa's farm. My grandpa doesn't farm too much anymore and has converted a lot of his fields into wildlife habitat areas. In these areas he encourages the growth of native plants that provide food and shelter for all kinds of wildlife. My grandpa told us he has seen animals such as white-tailed deer, eastern cottontail rabbits, and black bears looking for food in the fields and forests nearby. Before we started our walk, I asked my grandpa if the stream behind his house was still there. He told me it was, but that it was much smaller because last year a family of beavers built a dam that reduced the stream's water flow. He said he doesn't mind though because the pond behind the dam is a good place to catch fish and to watch great blue herons and river otters. After talking to my grandpa, Sam and I were excited to start our walk. We hoped we would see the animals my grandpa had talked about.

We went to the beaver pond first but didn't see any beavers. They were probably asleep in their lodge, waiting until nightfall to become active. As we walked along the edge of the pond, we found a scat that contained a lot of fish scales. We determined that the animal that left this scat ate fish and was a _____. The scat looked fresh—we had probably just missed seeing the animal slide into the water and swim away. We continued our walk and soon found a different scat. This one was located on the flat mud bank near the edge of the water. It looked like someone had dropped white paint on the mud. We knew right away that this scat was from a _____. As we examined this white and watery mark, the animal that made it emerged from nearby cattails and flew away with a "Squawk! Squawk! Squawk!"

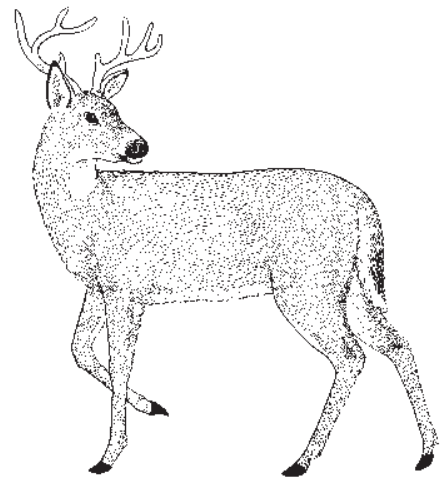
After walking around the beaver pond, Sam and I hiked to a nearby field filled with several kinds of grasses and berry plants. On the edge of the field near a thick patch of blackberries, we found a very large scat. In it we could see bits of grass, blackberry seeds, and beetle wings. This scat could only be from a _____! We hoped this animal was searching for food in another field right then. We quickly left the blackberry patch and walked through the field, hoping to startle some animals into giving away their locations. We didn't see any animals, but we did find two piles of small, dark brown scat. We

examined the two piles closely and discovered that the two groups of scat were different from one another. The first group had seven scats while the second group had 26 scats. The scats in the first group were smaller and rounder than the scats in the second group. We figured out that the smaller scats were made by a _____ and the larger scats were made by a _____. As we started back to my grandpa's house, the animal responsible for making the smaller scat jumped out of a clump of grass and hopped away.

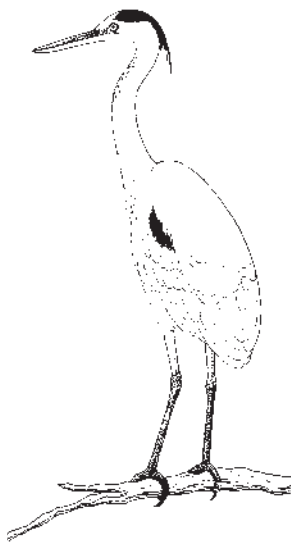
Sam and I returned to the house, excited by our discoveries. Imagine being that close to a bear! My grandpa asked us about the things we saw on our walk. We told him that we had found the scat of a black bear, an eastern cottontail rabbit, a great blue heron, a river otter, and a white-tailed deer.



black bear



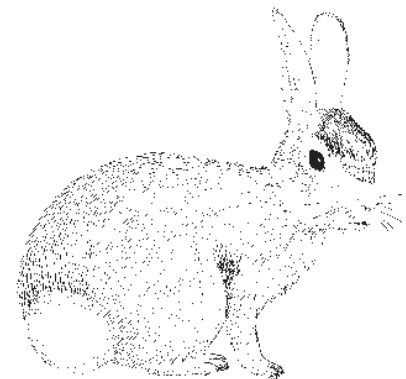
white-tailed deer



great blue heron



river otter



eastern cottontail rabbit

Animal Scat

Exhibit Hall Activity

Suggested Grade Level: 3-5

Skills Practiced

- Observing
- Inferring

N.C. Science Curriculum Competency Goals

Grade 4

1.0 Animal growth and adaptation

Grade 5

1.0 Interdependence of plants and animals

Objective

Students will practice the skills and knowledge gained during the Mystery Scat pre-visit activity.

Background

Studying scat (animal feces) can tell us a lot about the animals that live around us today. By examining an animal's scat you can determine whether the animal is a carnivore, a herbivore, or an omnivore. In many cases, you can figure out the animal's identity. Further study of the scat can reveal information about the animal's diet and size.

Materials

- Mystery Scat story
- Whose Scat is That? interactive display located near the Savanna diorama in the Mountains to the Sea exhibit hall

Teacher preparation

1. Using the exhibit hall map on page 5, familiarize yourself with the location of the Savanna diorama.
2. In case your students have difficulty locating the animals on their Mystery Scat sheets, here is a list of the animals and their habitat locations in the exhibit hall:

black bear	Savanna
white-tailed deer	Mountain Cove & Piedmont
eastern cottontail rabbit	Piedmont
great blue heron	Bottomland
river otter slide*	Bottomland

**There is no river otter on display in the Mountains to the Sea exhibit hall; however, students can look for the otter slide modeled in the Bottomland diorama. An otter slide is a smooth, slightly hollowed out area on the bank of a river or pond and is formed by otters repeatedly sliding into the water.*

Activity

1. Before your trip to the Museum, do the Mystery Scat pre-visit activity on page 23 with your students.
2. When you arrive at the Museum, direct your students to the Whose Scat is That? display located in the Mountains to the Sea exhibit hall. Allow them time to work with the display. *Note: Only a few students at a time will be able to work with the scat display. Students who are waiting to use the display can find the animals listed on their Mystery Scat sheets.*

Extensions

Have each student or group of students select an animal on display in the Mountains to the Sea exhibit hall and research the following questions: Is the animal a carnivore, herbivore, or an omnivore? What does this animal eat? What might its scat look like (e.g., filled with fish scales, fur, berry seeds)?

When you return to your classroom, have your students draw a food web diagram that includes the animals they researched while at the Museum.

References and Resources

Books for students

Secrets of a Wildlife Watcher, by Jim Arnosky

Tracks, Scat and Signs, by Leslie Dendy

Animal Tracks and Traces, by Kathleen Kudlinski

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes
Tracking and the Art of Seeing: How to Read Animal Tracks, by Paul Rezendes

Scat resources

Acorn Naturalist (800.422.8886) sells rubber scat.

All About Beavers

Exhibit Hall Activity

Suggested Grade Level: 3-5

Skills Practiced

- Observing
- Recording data

N.C. Science Curriculum Competency Goals

Grade 4

- 1.0 Animal growth and adaptation

Grade 5

- 1.0 Interdependence of plants and animals

Objective

Students will be able to identify beavers and their signs.

Background

The beaver is the second largest rodent in the world (the capybara, an aquatic rodent from South America, is the largest). Like all rodents, a beaver's front teeth grow continuously. However, these teeth never grow too large since they are worn down and sharpened when the beaver chews on wood. Beavers do not eat wood, but consume the inner bark (cambium) and leaves of trees and shrubs and the stems and roots of aquatic plants.

A beaver spends a large part of its life in the water and is well adapted for an aquatic lifestyle. Its hind feet are webbed, which helps make the beaver an agile swimmer. When it dives, a beaver completely closes its ears and nose and uses its transparent eyelids to see underwater. A beaver is able to store additional air and oxygenated blood in its unusually large lungs and liver. This ability allows the beaver to stay underwater for up to 15 minutes.

While a beaver is agile and quick in the water, it is much slower and more vulnerable on land. To avoid predators, a beaver usually limits its time out of water to the night. For this reason, it is difficult to find beavers during the day. Instead, you will need to look for signs of beaver activity to determine whether or not beavers live in the area. Signs that indicate a beaver family lives nearby include a lodge, a dam, scent mounds, sticks with bark stripped off, chewed trees, piles of wood chips, shallow canals, alarm calls (tail slap on water), or tracks.

A recreated beaver pond is located in the Piedmont habitat diorama. Around it your students will be able to find a beaver, various beaver signs, and other animals that commonly live in or around beaver ponds. Next to the pond is a text panel that contains additional information about beavers.

Materials

- Beaver Signs activity sheet
- pencils
- clipboards

Teacher preparation

1. Make a copy of the Beaver Signs sheet for each student, or, if you intend for your students to work in groups, make a copy for each group.
2. Using the exhibit hall map on page 5, familiarize yourself with the location of the Piedmont habitat diorama.

Activity

1. Before arriving at the Museum, hold a class discussion about beavers. Explain that during their visit to the Museum, your students will do an activity that will require them to search the dioramas for beavers and their signs.
2. When you enter the Mountains to the Sea exhibit hall, go to the Piedmont habitat diorama. Hand out the Beaver Signs activity sheets and make sure all students (or groups) have pencils and clipboards.
3. Give the students time to explore the Piedmont habitat diorama and to complete the activity sheet.
4. After the students have filled out the activity sheets, review their answers and any other observations they made during their exploration.

Extensions

When you return to your school, plan a field trip to a nearby beaver pond.

Additional information and activities about beavers are available in the Museum's *Freshwater Wetlands—Life at the Waterworks* educator's guide and video. For ordering information, contact Barbara Beaman at 919.733.7450, ext. 610, or barbara.beaman@ncmail.net.

References and Resources

Books for students

The Beaver, by Hope Ryden

Animal Tracks and Traces, by Kathleen Kudlinski

“Beaver” in *North Carolina Wild: Wildlife Profiles Series*,
by Chris McGrath and Perry Sumner

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes

*National Audubon Society: Field Guide to North American
Mammals*, by John O. Whitaker Jr.

Mammals of the Carolinas, Virginia, and Maryland,

by William Webster, J.F. Parnell, and W.C. Biggs

Meet the Beaver, by Leonard Rue, III and William Owen

The World of the Beaver, by Leonard Rue, III

Additional beaver resources

A Guide to Night Sounds, by Lang Elliot

Beaver Signs

1. Beavers often use scent to mark their territories. They build scent mounds out of _____ and _____ and mark the mounds with castoreum, a strong-smelling liquid.
2. Draw a picture of a scent mound in the space provided below.
3. When beavers are alarmed, they slap the surface of the water. This loud sound alerts other beavers in the area that danger is nearby. Look at the beaver on display in the diorama. What part of its body do you think a beaver uses to make this warning sound? _____
4. Many animals live in and around beaver ponds. Draw pictures of some of the animals you see in and around the beaver pond.

5. Look carefully in the Piedmont habitat diorama. How many beaver signs can you find? Write them down in the space provided below.

6. There are a few beaver tracks on the beaver dam as well as on the text panel next to the beaver pond. A beaver's front feet look like small, five-fingered hands (about three inches long) while its back feet are much larger (about five to six inches long) and have webbing between the five toes. Can you find the beaver's tracks? Draw pictures of the tracks you find.

7. What additional information about beavers would you like to discover? Write down one or two of the questions you have about beavers or their signs.

Owl Pellets

Post-visit Activity

Suggested Grade Level: 3-5

Skills Practiced

- Observing
- Identifying
- Collecting data
- Predicting
- Inferring

N.C. Science Curriculum Competency Goals

Grade 4

- 1.0 Animal growth and adaptation

Grade 5

- 1.0 Interdependence of plants and animals

Objective

Students will be able to identify the contents of an owl pellet.

Background

Owls live all around us but their nocturnal habits, camouflaged bodies, silent flight, and shy nature make them difficult to find. An owl may live around your school grounds or your neighborhood, but you may have difficulty seeing it unless you know what signs to look and listen for.

At night, you can listen for owl calls. Each species has its own distinctive call; therefore it is relatively easy to identify an owl by its call. During the day you can search for signs which indicate that an owl lives in the area. These signs include feathers, medium-size tree cavities, whitewash, and pellets. Whitewash is owl scat that has accumulated in one place over time, usually below a roosting site. Owls commonly have two roosting sites, one that is used during the day and one that is used at night. An owl may use the same sites for several days or even weeks. As a result, a large amount of whitewash builds up. Accumulations of owl pellets can also be found beneath roosting sites.

Approximately 6 to 12 hours after swallowing its prey whole, an owl coughs up a compact pellet that contains undigested prey materials such as fur, teeth, feathers, bills, bones, and exoskeletons. A pellet's size and contents can help you determine the identity of the owl that made it. A screech owl's pellet is much smaller than a great horned owl's pellet and commonly contains the remains of smaller prey items such as insects. By examining the contents of an owl's pellets, you can learn about the owl's diet.

Materials

- owl pellets (see ordering information in References and Resources)
- dissecting trays or paper plates
- tweezers
- probes (or thin bamboo skewers, toothpicks, sharpened pencils)
- hand lenses
- skull and bone identification guides (see References and Resources for suggestions)

Teacher preparation

1. Determine into how many groups you will divide your class. *Note: This activity works best when you limit the number of students per group to four.*
2. Order enough owl pellets to supply each group with a pellet.
3. Gather the rest of the materials listed above.

Activity

1. Hold a class discussion on owls and their habits (hunt at night; mostly inactive during the day). Talk about what owls eat and what they can and cannot digest. Explain what pellets are. Brainstorm with your students what signs they could look for to determine if owls are present (pellets, feathers, calls, nest, etc.).
2. Divide students into work groups and distribute dissecting supplies and owl pellets.
3. Instruct the groups to begin their investigation of the pellets. Remind them to use care when handling the pellet since the contents are fragile.
4. Have the groups record their observations. Does their pellet contain fur? feathers? bones? Can they identify the bones (e.g., skull, leg bone)? Can they tell if the bones are from one animal or from multiple animals?
5. Using the skull and bone identification guides, ask your students to try to determine the identity of the prey.

Extensions

Have your students find out what species of owls can be found in your area and then research the owls' life histories. If your school grounds has suitable owl habitat, build owl nest boxes and put them up.

Learn to identify owls by their calls and then go on an evening owl hunt. It is possible to attract owls by playing a recording of their calls. Remember to bring flashlights so that you can see any owls that come to investigate the recorded calls! *Note: Owls are very territorial and use their calls as a way to defend their territories. To avoid driving away owls living in your area, do not do play owl calls more than once a week.*

Check the Internet for owl Web sites. Over the years, various Web sites have posted pictures taken by cameras set up inside owl nests. Visitors to these sites can follow the development of the owlets from eggs to fledglings. The addresses of these sites change from year to year, but a search of the Internet should yield several sites.

References and Resources

Books for students

All about Owls, by Jim Arnosky

Tiger with Wings: The Great Horned Owl,

by Barbara Juster Ebsen

The Barn Owl, by Bert Kitchen and Sally Tagholm

The Book of North American Owls, by Helen Roney Sattler

Books for teachers

A Key Guide to Mammal Skulls and Lower Jaws: A Non-

Technical Introduction for Beginners, by Aryan I. Roest

Bird Behavior, volume III, by Donald and Lillian Stokes

Skulls and Bones: A Guide to the Skeletal Structures and

Behavior of North American Mammals, by Glenn Searfoss

How to Spot an Owl, by Patricia and Clay Sutton

Birds of the Carolinas, by Eloise F. Potter, James F. Parnell,

and Robert P. Teulings

Owl sound resources

A Guide to Night Sounds, by Lang Elliot

Birding by Ear: A Guide to Bird-Song Identification,

by Richard Walton and Robert Lawson

Owl pellet ordering information

Acorn Naturalist 800.422.8886

Carolina Biological Supply 800.334.5551

Track Story

Post-visit Activity

Suggested Grade Level: 3-5

Skills Practiced

- Communicating ideas
- Interpreting data

N.C. Science Curriculum Competency Goals

Grade 4

- 1.0 Animal growth and adaptation

Grade 5

- 1.0 Interdependence of plants and animals

Objective

Students will be able to describe events based on an interpretation of animal tracks.

Background

Whether an animal walks, runs, hops, or slithers, it can leave behind tracks for us to interpret. The amount of information we can gather by studying tracks depends on the quality and quantity of tracks. One or two clear footprints are probably enough to identify the animal that made them, but unless there are other clues nearby, so few footprints are not sufficient to determine what the animal was doing. The reverse can also be true. If you find a lot of tracks in one place, you can hypothesize what the animal was doing when it made the tracks, but unless you find one or two clear tracks it will be difficult to positively identify the animal. The ideal situation is to find a lot of good quality tracks. When this happens, you can identify the tracks and interpret the stories they tell.

Of course, the identification and interpretation of tracks can be made easier if you find additional signs near the tracks, are familiar with the habits of the animals you are tracking, or have an idea of what animals commonly live in the area. For example, if you find tracks near the edge of a pond that look a lot like miniature human hands and next to those tracks you also find empty clam shells, you can quickly conclude that the tracks belong to a raccoon who ate some clams. The raccoon's track story was easy for you to interpret because you know that raccoons commonly live near ponds, they hunt for aquatic animals such as clams, and their paws are shaped similarly to human hands.

Materials

- Track Story Samples sheet
- paper
- pencils
- tracks field guides (see References and Resources for suggestions)
- rubber animal tracks (optional) (see References and Resources for ordering information)

Teacher preparation

1. Determine into how many groups you will divide your class and then make enough copies of the Track Story Samples so that each group will receive a sheet.
2. Gather together enough pencils, paper, and track field guides to supply the groups.
3. The answers to the track stories are as follows:

Story 1

Objective: To illustrate different gaits and animal signs other than tracks.

Description: This story shows a black bear walking up to a berry bush, milling around the bush to eat some berries, and running away. Additional signs of bear activity include a log torn up in search of insects, fur caught on a tree branch, and bear scat.

Story 2

Objective: To show different track sizes of same species.

Description: These tracks show a doe and her fawn walking down to a stream to get a drink of water, walking in the stream, and getting out on the opposite bank several feet down from where they entered the stream.

Story 3

Objective: To illustrate two different species interacting with one another.

Description: This story shows a rabbit being pursued by a bobcat and then only the bobcat tracks. (The rabbit was captured.)

Story 4

Objective: To show the tracks of several different species that share the same habitat.

Description: A great blue heron, a raccoon, and a beaver have walked along the edge of the pond at some time. The raccoon left behind some empty clam shells.

Activity

1. Hold a class discussion about animal tracks. What are they? What can they tell you? Review the tracks of the following common North Carolina animals: black bear, white-tailed deer, eastern cottontail rabbit, bobcat, beaver, great blue heron, and raccoon.
2. Divide your students into groups and hand out the Track Story Samples sheets, paper, pencils, and tracks field guides.

3. Ask the groups to study the Track Story Samples sheets and to hypothesize what animal or animals made the tracks and what happened in each track story. Be prepared to guide students to more accurate interpretations of the track stories if it appears that they are way off base.
4. As a class, discuss the groups' findings.
5. Instruct the groups to create their own track story. You might want to suggest that they include no more than four or five animals in the story and that they use the tracks of common animals. To make the tracks for their stories, they may draw them or use rubber tracks.
6. When the groups are finished, have them trade stories with another group. Each group should now have a new story to interpret.
7. Based on feedback they get from other groups about how understandable their track story is, each group should make improvements and then post their story so that the entire class can enjoy it.

Extensions

Have your students make a class mural containing several track stories. Challenge other classes to interpret the stories.

Make a Track Box to put outside your classroom. See instructions on page 45.

Do the Interpreting Tracks post-visit activity described in the K-2 section of this guide.

Create a "real life" track story on your school grounds using rubber animal tracks.

References and Resources

Books for students

Secrets of a Wildlife Watcher, by Jim Arnosky

Tracks, Scat and Signs, by Leslie Dendy

Animal Tracks and Traces, by Kathleen Kudlinski

Books for teachers

A Guide to Animal Tracking and Behavior, by Donald Stokes

Tracking and the Art of Seeing: How to Read Animal Tracks,

by Paul Rezendes

A Field Guide to Animal Tracks, by Olaus J. Murie

A Field Guide to Mammal Tracking in North America,

by James Halfpenny

Rubber animal track ordering information

Acorn Naturalist 800.422.8886

NASCO 800.558.9595

Track Story Samples

Story 1



Story 2



Track Story Samples

Story 3



Story 4



Who Am I? part 1

Pre-visit Activity

Suggested Grade Level: 6-8

Skills Practiced

- Predicting

N.C. Science Curriculum Competency Goals

Grade 6

2.02 Terrestrial and aquatic food webs

2.03 How organisms interact with each other and their environment

Objective

Students will be able to identify selected native North Carolina animals and their signs.

Background

North Carolina is home to a wide variety of animal species. Some of these species, like the red-cockaded woodpecker, are endangered, while others, like the white-tailed deer, are so numerous their populations have to be reduced occasionally to prevent the deer from using up available resources such as food and shelter. While species, such as the beaver and the great blue heron, can be found in every county in North Carolina, others, like the timber rattlesnake and the spotted salamander, live only in certain parts of the state. All of North Carolina's animals have fascinating life histories and adaptations for survival.

Exhibit Hall Connections

The animals referred to in this activity can be found on display in the habitat dioramas located throughout the Mountains to the Sea exhibit hall.

Materials

- Animal Search sheet
- scissors
- hat

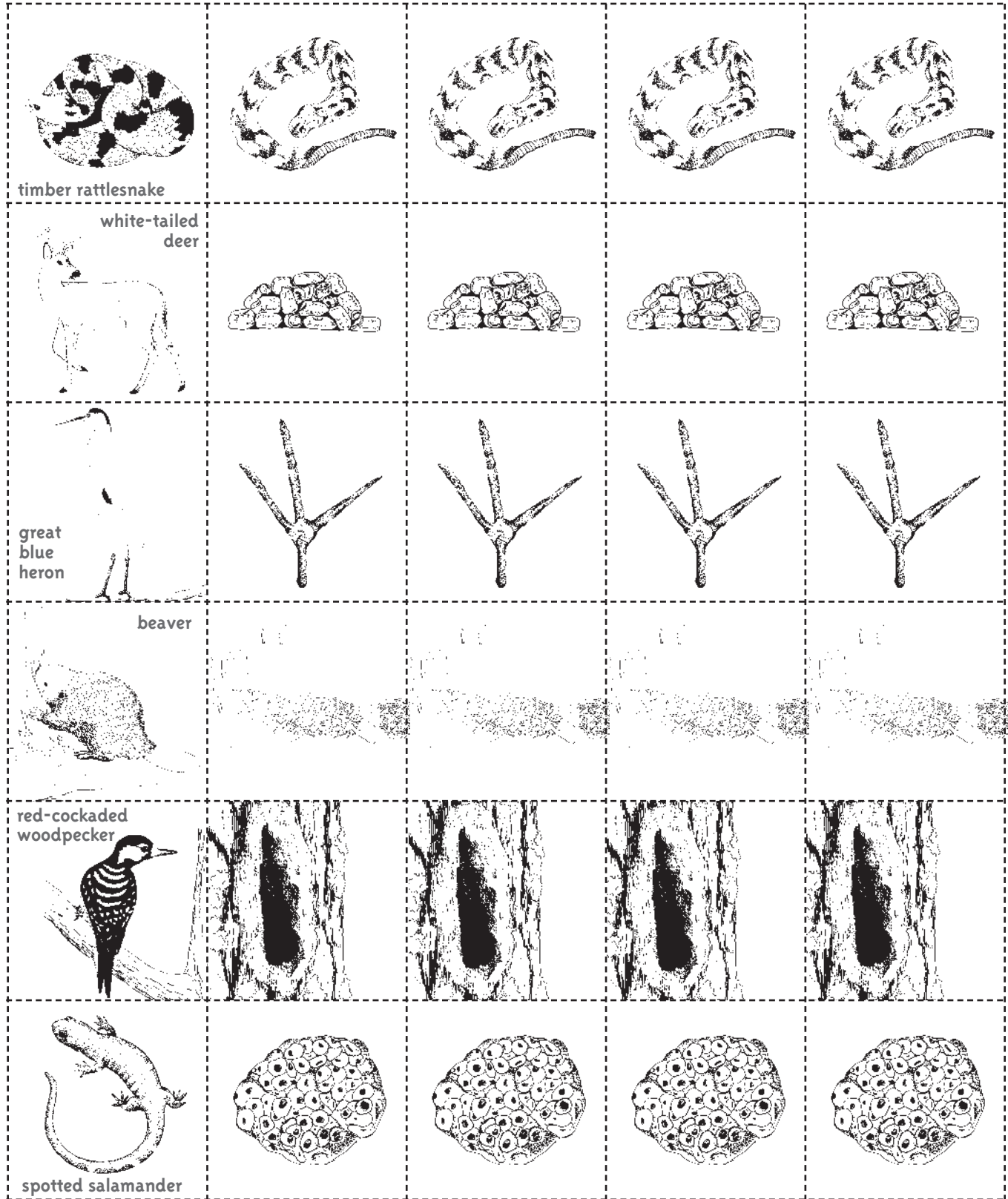
Teacher preparation

1. Make a copy of the Animal Search sheet.
2. Cut out the pictures of animals and their signs from the copy.
3. Fold the pictures in half.

Activity

1. Explain to your students that they will work in groups to research native North Carolina animals. They will form six groups according to the pictures they pull out of a hat. Each person will have a picture of either an animal or a sign. To discover the members of their group, they will need to match the animals with their signs (e.g., the beaver gets matched with the pictures of a beaver dam). *Note: This activity is designed to introduce your students to the animals they will research during their visit to the Mountains to the Sea exhibit hall and to establish work groups. If you prefer to control the composition of the groups, you should hand out the pictures to the appropriate students and then go to step 3.*
2. Place the folded pictures in a hat and allow each student to pick one. Ask them not to look at their picture yet.
3. After everyone has a picture, tell your students to look at their pictures.
4. Have your students get up and find the members of their group. Remind them that their task is to match animals with their signs.
5. Once the students have found their group, have them tell the rest of the class what their animal is and what kind of sign their animal might leave behind.
6. Have the groups brainstorm other kinds of signs their animals might make (e.g., tracks, sounds, scat, nests or other structures).
7. Prepare your students for Who Am I?, part 2.

Animal Search



Who Am I? part 2

Exhibit Hall Activity

Suggested Grade Level: 6-8

Skills practiced

- Observing
- Recording data

N.C. Science Curriculum Competency Goals

Grade 6

- 2.02 Terrestrial and aquatic food webs
- 2.03 How organisms interact with each other and their environment

Objective:

Students will research an animal using resources available at the Museum.

Background

Live animal displays, habitat dioramas, interactives, and text panels in the Mountains to the Sea exhibit hall will provide your students with valuable and engaging data about their research animals. While your students search for information about their animals, they also can examine the different types of displays and how these displays present information.

Materials

- 6 Data Sheets
- 6 clipboards
- 6 pencils
- Polaroid, disposable, or digital camera (optional)

Teacher preparation

1. If your students are unable to visit the Museum, have them research their animals at their school or public library or on the Internet. Students can also find valuable information in the books listed in the References and Resources section below.
2. In addition to searching for information about their animals in the Mountains to the Sea exhibit hall, it is strongly recommended that your students use the resources available in the Naturalist Center located on the fourth floor of the Museum. The Naturalist Center is designed to assist students in research projects by providing them access to an extensive collection of specimens from mammals to minerals and by having available books, computers, CD-ROMs, microscopes, and other lab equipment. If you are interested in having your students visit the Naturalist Center, contact John Connors, coordinator of the Naturalist Center, at 919.733.7450, ext. 602, to inquire about the Center's hours of operation.
3. Make a copy of the Data Sheet for each group.
4. Gather pencils and clipboards in the amounts needed.
5. Bring a camera to the Museum for the students to use to take pictures of their animals. (optional)

6. In case your students have difficulty locating their animals, here is a list of the animals and their habitat locations in the exhibit hall:

timber rattlesnake	Waterfall
white-tailed deer	Mountain Cove & Piedmont
great blue heron	Bottomlands
beaver	Piedmont
red-cockaded woodpecker	Savanna
spotted salamander*	Piedmont

**The spotted salamander on display is a live animal, not a prepared specimen.*

Activity

1. When you arrive at the Museum, have your students get into their work groups. Hand out the pencils, clipboards, and Data Sheets. Remind your students that in addition to finding information about their animals, they should look at how the Museum presents that information (e.g., in a diorama, on a text panel, through an interactive display).
2. When you enter the Mountains to the Sea exhibit hall, your students can begin their research. Remind them that the exhibit hall covers two floors.
3. Have your students continue researching their animals in the Naturalist Center. *Note: Before bringing your students to the Center, check to make sure it is open.*
4. If your students are unable to complete their research at the Museum, have them visit their school or local libraries or the Internet for additional information.

References and Resources

Books for students

- A Field Guide to Reptiles & Amphibians: Eastern and Central North America*, by Roger Conant and Joseph Collins
- A Field Guide to the Birds*, by Roger T. Peterson
- A Field Guide to the Mammals: North America North of Mexico*, by William Burt and R.P. Grossenheider
- A Guide to Amphibians and Reptiles*, by Thomas Tynning
- A Guide to Bird Behavior: Volume III*,
by Donald Stokes and L. Stokes
- Amphibians and Reptiles of the Carolinas and Virginia*,
by Bernard Martof, et al.
- Birds in Jeopardy: The Imperiled and Extinct Birds of the United State and Canada, Including Hawaii and Puerto Rico*, by Paul Ehrlich, D.S. Dobkin, and D. Wheye
- Birds of the Carolinas*,
by Eloise Potter, J.F. Parnell, and R.P. Teulings
- Deer and Elk*, by D.H. Patent
- Lives of North American Birds*, by Kenn Kaufman
- Mammals of the Carolinas, Virginia, and Maryland*,
by William Webster, J.F. Parnell, and W.C. Biggs
- Reptiles of North Carolina*,
by William Palmer, and A.L. Braswell
- Salamanders*, by Cherie Winner
- Salamanders of the United States and Canada*,
by James Petranka
- The Audubon Society Encyclopedia of North American Birds*,
by John Terres
- The Secretive Timber Rattlesnake*, by B. Lavies
- Wild Mammals of North America: Biology, Management and Economics*, edited by Joseph Chapman and G.A. Feldhamer

Who Am I? Data Sheet

Place picture
of animal here.

About your animal

Common name _____

Scientific name _____

Is this animal an amphibian, a reptile, a bird, or a mammal? _____



On the North Carolina map below, draw where this animal lives.

In what kind of habitat does it live? _____

Does this animal use a shelter? _____

If yes, what does the shelter look like? _____

What does this animal eat? _____

What is the typical life expectancy of this animal? _____

When does this animal breed? _____

Does it lay eggs or give birth to live young? _____

How many young does it have? _____

What signs does this animal leave behind? _____

Write down three additional questions that you have about your animal. _____

About the Museum exhibits

In what kinds of displays did you find information about your animal? _____

Describe the dioramas or displays where you found your animal. _____

If you had the chance to design a display for your animal, what would it look like? What information would it contain? _____

Who Am I? part 3

Post-visit Activity

Suggested Grade Level: 6-8

Skills Practiced

- Presenting data

N.C. Science Curriculum Competency Goals

Grade 6

- 2.02 Terrestrial and aquatic food webs
- 2.03 How organisms interact with each other and their environment

Objective

Students will present detailed information on selected North Carolina animals.

Background

Museums use a variety of methods to present information to the public. They publish scientific reports, popular magazines, and books and offer classes, field trips, and special events. They also develop and install exhibits filled with informative displays.

A museum display can be large or small, complex or simple, depending on the information the display needs to present. Displays run the gamut from recreating a habitat, with all its characteristic plants, animals, and landforms, to using a simple illustration to show the minute details of a microscopic organism. Museums must consider a variety of factors when designing a display, such as where the display will be installed, how much time and money it will take to build, and what information will need to be presented. Museums also must think about who their audience is (e.g., children, adults, all ages) and then build age-appropriate displays. When museums write text to accompany displays, they must make sure the information is accurate and interesting. Due to limitations of space and short attention spans of visitors, museum text is kept short—usually 75 words or less.

Materials

- You and your students will develop a list of materials required to build the displays for your classroom museum. Encourage your students to utilize recycled materials (e.g., shoe boxes, film canisters) whenever possible.

Teacher preparation

1. Select a location for your classroom museum.

Activity

1. Hold a class discussion during which you and your students discuss museum displays. What kinds of displays are there? (e.g., dioramas, interactives, text panels, live animal displays). What considerations must be taken into account when planning and building a display? (e.g., time, cost, space, audience, availability of materials and specimens). How do you decide what information to present in a display? Explain that they will work in groups to design and build displays for a classroom museum. The subjects of the displays will be the animals that each

group researched at the Museum. As a class, develop a list of guidelines for your students to use when designing and building their displays. These guidelines should include the approximate size of the display, the type of information to be presented, the amount of text allowed, suggested materials, cost, etc.

2. Have your students get into their groups and develop a proposal for their displays. Include a sketch of the proposed display. Make sure each group has a copy of the display guidelines developed during the class discussion.
3. Review the proposals with each of the groups to make sure the proposed displays are practical and contain the necessary components discussed in the guidelines.
4. Provide your students with the time, materials, and assistance required to build their displays.
5. When the displays are completed, arrange them in the location chosen for the classroom museum.

Extensions

Invite other classes to visit your students' museum.

Have your students write a children's story about their animals. See K-2 References and Resources list on page 43 for examples.

References and Resources

Books for students

Are Those Animals Real?: How Museums Prepare Wildlife Exhibits, by J. Cutchins and G. Johnston
Auks, Rocks and the Old Dinosaur, by P. Thomson
Building Your Own Nature Museum, by V. Brown
Dinosaurs, Dragonflies and Diamonds: All about Natural History Museums, by G. Gibbons
From the Mixed-up Files of Mrs. Basil E. Frankweiler, by E.L. Konigsburg
Frozen Snakes and Dinosaur Bones: Exploring a Natural History Museum, by M. Facklam

References and Resources

Books for students grades K-2

- Arnosky, Jim. 1989. *Crinkleroot's Book of Animal Tracking*. Bradbury Press.
- Arnosky, Jim. 1995. *I See Animals Hiding*. Scholastic.
- Dorros, Arthur. 1991. *Animal tracks*. Scholastic.
- Hirschi, Ron. 1994. *A Time for Singing*. Cobblehill Books.
- Levi, H. W. 1990. *Spiders and Their Kin*. Golden Press.
- McGrath, Susan. 1987. *How Animals Talk*. National Geographic Society.
- Mitchell, R. T. and H. S. Zim. 1987. *Butterflies and Moths*. Golden Press.
- Selsam, Millicent E. 1995. *How to Be a Nature Detective*. HarperCollins Pubs.
- Selsam, Millicent E., and J. Hunt. 1989. *Keep Looking!* MacMillan.
- Wright, A. B. 1993. *Peterson's First Guides: Caterpillars*. Houghton Mifflin Company.
- Zim, H. S. and C. Cottam. 1987. *Insects*. Golden Press.
- Zim, H. S. and H. S. Smith. 1987. *Reptiles and Amphibians*. Golden Press.
- Zim, H. S. and Ira N. Gabrielson. 1987. *Birds*. Golden Press.

Books for students grades 3-5

- Arnosky, Jim. 1995. *All about Owls*. Scholastic.
- Arnosky, Jim. 1983. *Secrets of a Wildlife Watcher*. Lothrop, Lee & Shepard Books.
- Dendy, Leslie. 1998. *Tracks, Scats and Signs*. Northword Press.
- Ebsen, Barbara Juster. 1991. *Tiger with Wings: The Great Horned Owl*. Watts/Orchard.
- Kitchen, Bert (illustrator), and Sally Tagholm. 1999. *The Barn Owl*. (Animal Lives). Larousse Kingfisher Chambers.
- Kudlinski, Kathleen. 1991. *Animal Tracks and Traces*. Watts.
- McGrath, Chris and Perry Sumner. 1992. "Beaver" in *North Carolina Wild: Wildlife Profile Series*. North Carolina Wildlife Resources Commission.
- Ryden, Hope. 1986. *The Beaver*. Putnam.
- Sattler, Helen Roney. 1995. *The Book of North American Owls*. Clarion.

Books for students grades 6-8 and teachers

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Suppliers

Acorn Naturalist 800.422.8886
Carolina Biological Supply 800.334.5551
NASCO 800.558.9595

Museum of Natural Sciences Resources

The Museum offers a wide variety of student programs and staff development workshops that take place at the Museum, at your school, and at natural areas across the state. Receive a free copy of the Educator's Guide to Museum Services and find out about these opportunities. For more information, contact Barbara Beaman, coordinator of classroom programming, at 919.733.7450, ext. 610 or barbara.beaman@ncmail.net, or visit the Museum's Web site at www.naturalsciences.org.

Classroom Projects

Track Box

You and your students can use a track box to determine what animals live around your school grounds, when they are active (e.g., at night, after rain), and how they move—do they slither, crawl, hop, walk, or run?

Materials

- two 8-foot-long 2"x4" boards
- saw
- nails
- corner brackets (optional)
- large plastic garbage bag
- sand
- plastic rake
- watering can
- shallow bird bath or plastic plant saucer
- bird seed, fruit, or whole nuts

Constructing the track box

Note: You should have your students help with as many of the steps as they can.

1. Pick a location away from foot traffic and close to water and/or other areas that might attract animals (e.g., brush pile, bird feeders).
2. Cut each 8-foot board in half so that you end up with four 4-foot-long pieces. *Note: When you purchase the boards, you can ask the lumber store to cut them for you.*
3. Make a 4'x4' frame using the freshly cut boards. Nail the boards together at the corners. (Optional: To make the frame stronger, secure the corners using corner brackets.)
4. Cut the plastic garbage bag so that you can cover a 4'x4' section of ground. The plastic will create a weed barrier.
5. Place the garbage bag on the ground where you want your track box to be located. Set the 4'x4' frame on top of the plastic to create the track box.
6. Fill the box with sand and level the surface using the rake. *Note: For best results, keep the box filled with sand and keep the sand moist and level.*
7. Bait the box with a shallow bird bath set on top of the sand or with bird seed, whole nuts, fruit, or other items that might attract animals.

Suggested activities

Divide students into groups. Assign each group a day of the week during which they will be responsible for checking the track box and recording any tracks seen. The groups should also make sure the sand stays level and moist. (Use a watering can to gently moisten the sand.)

Make plaster of Paris casts of tracks found. To begin, make a collar to put around the track. The collar needs to be large enough to fit completely around the track and leave a one- to two-inch margin around the track. The collar will contain the plaster of Paris and keep the plaster from making a mess. Collars can be made of cardboard, plastic rings cut from 2-liter bottles, folded newspaper, etc. When the collar is ready, place it around the track and gently push it about ½ inch into the sand. Next, combine plaster of Paris with enough water to make a pourable mixture (about the consistency of pancake batter). Pour enough of the plaster mixture to completely fill the track. Allow the plaster track to harden before picking it up. When the plaster has dried completely (one day is usually sufficient), you can rinse the plaster track with water to remove sand or other debris that might be stuck to the track. To add color to the track casts, stir several drops of food activity into the plaster mixture before you pour the plaster into the tracks.

Classroom Projects

Animal Tracks and Signs Resource Box

With relatively little effort, you can put together an Animal Tracks and Signs resource box. All you really need to start your resource box is a storage container, some resealable plastic bags (or other clear containers), and time to go collecting. You don't even need to do all the collecting yourself. More than likely, your students will be very happy to supply the resource box with items they find. The best part about making your own resource box is that the objects in your box will reflect the animals that live on your school grounds and in your neighborhood.

Here are a few things that you probably can find on your school grounds:

- mud dauber nests
- paper wasp nests
- insect galls on twigs or leaves
- caterpillar frass (scat)
- chewed nuts or pine cones
- cicada exoskeletons
- insect and spider sheds

Note: Unless you have a permit, do not collect bird nests.

You can purchase rubber tracks and scat from the companies listed below:

Acorn Naturalist 800.422.8886

NASCO 800.558.9595

A few age-appropriate field guides are very useful in any resource box. See References and Resources on page 43 for suggestions.

Additional copies of this publication
may be obtained from
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